

Claims

What is claimed is:

5     1. A circuit assembly adapted to be implanted within a living body, comprising:  
          a core element formed of a first thermoplastic material;  
          at least one circuit element capable of conducting electricity positioned in  
proximity to the core element; and  
          an overmold structure formed of a second thermoplastic material, the overmold  
10    structure overlaying at least a portion of the core element and at least a portion of the at  
least one circuit element.

2.     The circuit assembly of Claim 1, wherein the surface of the core element includes  
predetermined ridge members to enhance the bonding of the core element to the  
15    overmold structure.

3.     The circuit assembly of Claim 1, wherein the core element includes a groove  
member to receive at least a portion of the at least one circuit element.

20    4.     The circuit assembly of Claim 1, wherein the core element includes at least one  
receptacle adapted to receive a conductive member formed, at least in part, of a  
conducting material.

5.     The circuit assembly of Claim 4, and further including a respective conductive  
25    member loaded into the at least one receptacle.

6.     The circuit assembly of Claim 5, wherein the at least one circuit element is  
electrically coupled to the respective conductive member loaded into the at least one  
receptacle.

7. The circuit assembly of Claim 5, wherein the respective conductive member is selected from the group consisting of a set-screw block and a connector member.

8. The circuit assembly of Claim 1, wherein the at least one circuit element includes  
5 multiple conductive traces that are mechanically coupled together.

9. The circuit assembly of Claim 1, wherein the at least one circuit element includes a connector pad adapted to couple to an implantable medical device.

10 10. The circuit assembly of Claim 1, wherein the first and the second thermoplastic materials are each selected from the group consisting of polyurethane and polysulfone.

11. The circuit assembly of Claim 1, wherein the core element is formed using an injection mold process.

15 12. The circuit assembly of Claim 1, wherein the core element is formed using a machining process.

13. The circuit assembly of Claim 1, wherein the mass of the core element is less than  
20 fifty percent of the mass of the overmold structure.

14. A connector assembly to couple to an implantable medical device, comprising:  
a core portion formed of thermoplastic material;  
a first circuit element positioned adjacent to the core element; and  
25 an overmold portion formed of thermoplastic material adjacent to at least part of the core portion and at least part of the first circuit element.

15. The connector assembly of Claim 14, wherein the surface of the core portion includes predetermined ridge members to enhance bonding of the core portion to the  
30 overmold portion.

16. The connector assembly of Claim 14, wherein the surface of the core portion includes predetermined groove members to position at least a portion of the at least one circuit element in a predetermined location on the surface of the core portion.

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17. The connector assembly of Claim 14, wherein the core portion includes a first receptacle.

18. The connector assembly of Claim 17, and further including a connector member  
10 loaded into the first receptacle.

19. The connector assembly of Claim 18, wherein the core portion includes a second receptacle.

15 20. The connector assembly of Claim 19, and further including a set-screw member loaded into the second receptacle.

21. The connector assembly of Claim 20, wherein the first circuit element is coupled to at least one of the connector member and the set-screw member.

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22. The connector assembly of Claim 18, wherein the connector member includes a connector adapted to electrically couple to a medical electrical lead.

23. The connector assembly of Claim 22, wherein the connector member is adapted to  
25 conform to the IS-1 standard.

24. The connector assembly of Claim 22, wherein the connector member is adapted to conform to the DF-1 standard.

25. The connector assembly of Claim 22, and further including at least one additional connector member positioned adjacent to the core portion, the at least one additional connector member adapted to coupled to a medical electrical lead.

5 26. The connector assembly of Claim 14, wherein the at least one circuit element includes multiple conductive traces.

27. The connector assembly of Claim 23, wherein the multiple conductive traces are electrically isolated.

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28. The circuit assembly of Claim 14, wherein the mass of the core portion is less than fifty percent of the mass of the overmold portion.

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29. The circuit assembly of Claim 14, wherein the mass of the core portion is less than thirty percent of the mass of the overmold portion.

30. A process for making a circuit assembly for use in an implantable medical device, comprising the methods of:

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a.) forming a core element of thermoplastic material;  
b.) positioning at least one circuit element adjacent to the core element; and  
c.) forming an overmold structure of thermoplastic material over at least a portion of the core element and at least a portion of the circuit element.

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31. The process of Claim 30, wherein method a.) includes the method of forming the core element using an injection mold process.

32. The process of Claim 30, wherein method a.) includes the method of forming the core element using a machining process.

33. The process of Claim 30, wherein method a.) includes the method of forming ridges on the surface of the core element.

34. The process of Claim 33, wherein method b.) includes the method of  
5 aligning the circuit element on the surface of the core element using at least one of the ridges as a guide.

35. The process of Claim 30, wherein method c.) includes the method of:  
c1.) positioning the core element and the at least one circuit element in a mold;  
10 and  
c2.) injecting thermoplastic material into the mold.

36. The process of Claim 35, wherein step c.) further includes the method of heating the core element prior to performing the injecting method.

15 37. The process of Claim 33, wherein method c.) includes the method of melting at least one of the ridges on the surface of the core element.

20 38. The process of Claim 30, wherein method c.) includes encapsulating the core element within the overmold structure.

39. The process of Claim 30, wherein method a.) includes forming the core element to have a mass that is less than half of the mass of the overmold structure.

25 40. The process of Claim 30, wherein method a.) includes forming the core element to have a mass that is less than thirty percent of the mass of the overmold structure.

41. The process of Claim 30, and further including the step of positioning at least one connector member adjacent to the core element prior to performing method c.).

42. The process of Claim 41, wherein method a.) includes the method of forming the core element to have a receptacle to receive the connector member.

5 43. The process of Claim 42, wherein method b.) includes the method of electrically coupling the at least one connector member to the at least one circuit element.

44. The process of Claim 43, wherein method b.) includes the method of performing the electrical coupling by soldering or welding the at least one connector member to the at least one circuit element.

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45. The process of Claim 30, wherein the at least one circuit element includes multiple conductive traces, and further including the method of removing a selected portion of the multiple conductive traces.

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46. The process of Claim 35, wherein the mold includes at least one coupling member to couple to the core element, and wherein method c.) includes the method of coupling the at least one coupling member to the core element prior to performing the injecting method.

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47. The process of Claim 35, wherein the mold includes at least one coupling member to couple to the circuit element, and wherein method c.) includes the step of coupling the at least one coupling member to the circuit element.

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48. The process of Claim 47, wherein the method of coupling the at least one coupling member to the circuit element includes the method of suspending the core element within a cavity of the mold.